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IMPROVED PROTECTIVE COATINGS FOR SONAR DOMES.(U)
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Lab. Project 930-43
Technical Memorandum 9
SS-041, W.U. 8213

IMPROVED PROTECTIVE COATINGS FOR SONAR DOMES

LEVEL II

Material Sciences Division

U. S. NAVAL APPLIED SCIENCE LABORATORY
BROOKLYN, NEW YORK

(6) IMPROVED PROTECTIVE COATINGS
FOR
SONAR DOMES.

(9) Lab. Project 930-43, Technical Memorandum #9

SS-041, Task 8213

(11) 30 OCT 1961 (12) 11p.

MATERIAL SCIENCES DIVISION

(14) NASL-930-43-TM-9

Approved: D. N. Kallas
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U.S. NAVAL APPLIED SCIENCE LABORATORY
FLUSHING AND WASHINGTON AVENUES
BROOKLYN, NEW YORK 11251

AB

Lab. Project 930-43
Technical Memorandum No. 9

Ref: (a) NASL Contract N00140-67-C-0107 of 17 Oct 1967
(b) NASL Program Summary, Task No. 8213, Improved Protective Coatings for Sonar Domes, of 1 May 1967
(c) FONECON btwn A. Cizek (NASL, Code 937) R. Kramer (NAVSEC, Code 6101C01) on 21 Feb 1966
(d) N.Y.U. ltr (NASL Contract N00140-67-C-0107) to A.W. Cizek (NASL) of 3 Aug 1967
(e) N.Y.U. ltr (NASL Contract N00140-67-C-0107) to A.W. Cizek (NASL) of 31 Aug 1967
(f) Lab. Project 9300-43, Tech Memo #5, Improved Protective Coatings for Sonar Domes of 4 Apr 1966
(g) Lab. Project 9300-43, Progress Report #1, Improved Protective Coatings for Sonar Domes of 25 Mar 1966

Encl: (1) Copy of reference (d)
(2) Copy of Reference (e)
(3) Table I - Results of Sonic Erosion Test
(4) Photo L-21422, View showing degree of erosion of experimental sonar dome coating systems

1. The U.S. Naval Applied Science Laboratory is continuing the monitoring of a contract, reference (a) with New York University, which is currently funded equally by NAVSEC under Task Area SF 013-13-01, Task 0908, and Task Area SF 101-03-17, Task 8213, for the development of sonar dome coating systems which have good erosion resistance, good antifouling properties, and are able to remain adhered when exposed to high level sonic pulses generated by high power sonar transducers. In a similar study at NASL, as described in reference (b), a high sonic pulse facility was established for screening candidate sonar dome coating systems. This study has been terminated at NASL on 30 June 1967. On the occasion of reference (c), NASL was requested to screen selected sonar dome coating systems developed by New York University, under the above contract in the NASL facility.

2. This report presents data on three coating systems prepared by Prof. Kronstein under the above contract and submitted under references (d) and (e) for screening in the NASL high sonic pulse facility.

3. The coating systems submitted for evaluation are described in enclosures (1) and (2). The facility and test procedure, described in reference (g), used for screening of the coating systems, consists of a test tank and a single SQS-26 sonar transducer as the high pulse generator.

4. The results of the tests on the three coating systems are tabulated in Table 1, with the resulting erosion patterns shown in enclosure (4).

5. The results of tests indicate, that although the latest three experimental coating systems submitted by New York University are an improvement over the five systems previously reported in reference (c), substantial erosion of the coating systems to the metal base still exists. Thus, these coatings are not considered suitable for use on sonar domes.

6. In discussing the results of tests with Dr. Kronstein of New York University, he has advised the Laboratory that further improvement will be made of formulation of the coatings on panels A and C as described in references (d) and (e), respectively.

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Enclosure (1)

NEW YORK UNIVERSITY
School of Engineering and Science
UNIVERSITY HEIGHTS, NEW YORK, N.Y. 10453
AREA 212 584-0700

Research Division

August 3, 1967

Mr. A. W. Cizek, Code 937
U. S. Naval Applied Science Laboratory
Flushing and Washington Avenues
Brooklyn, N. Y. 11251

Reference: Contract N00140-67-C-0107.

Dear Mr. Cizek:

We would appreciate your exposing the two following panels in your test device to guide us in the further development:

PANEL A.

Preparation:

1) Sandblasted at the Brooklyn Laboratory.

2) Two coats of Wash-primer MIL-P-15328B (formula 117)

3) Several coats of red lead vinyl primer (MIL-P-15929B (formula 119)

Thickness of Steps 2) and 3) together 5.5 mil

4) Several coats of test paint V-4-152 (Report No. 3, TABLE 12)

Thickness of experimental test paint 17.0 mil

Total coating thickness 22.5 mil

Paint V-4-152 contains as elastomers: chlorosulfonated polyethylene
styrene-butadiene polymer
polyisoprene
with a small amount of a polyamide resin.

PANEL B. Preparation: 1) Sandblasted at Brooklyn Laboratory.
2) Two coats of Wash-primer MIL-P-15328B (formula 117)
3) Several coats of red lead vinyl primer MIL-P-15929B (f. 119)
Thickness of Steps 2) and 3) together 5.5 mil
4) Nine coats of test paint V-5-22
Thickness of this 18.0 mil
Total coating thickness 23.5 mil.

Paint V-5-22 has the following composition:

9 parts	Carbonblack (MONARCH 74)
22 parts	Zinc Oxide XX 601
50 parts	2-nitropropane
95 parts	33% solution of polyamide resin (VERSALON 1140), prepared from

Polyamide Resin	31.7
Propylalcohol	19.0
Benzene	44.3
Total	95.0

Ball-milled.

Added to the ballmilled paste:

13.0grams	Polyether Urethane Fluid(ADIPRENE L-100)
1.5 g.	Vaporized and Quenched Sulfur (CRYSTEX)
1.5 g.	Benzothiazyl Disulfide (ALTAX)

192 grams (41% solids)

All coats were brushed on and allowed to air dry. PANEL A was completed about four weeks ago; PANEL B about two weeks ago.

We hope that these data give you the necessary details about the preparation of these panels.

Yours very truly,

Max Kronstein

Max Kronstein
Senior Research Scientist

U.S. NAVAL APPLIED SCIENCE LABORATORY

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Enclosure (2)

NEW YORK UNIVERSITY
School of Engineering and Science
UNIVERSITY HEIGHTS, BRONX, N. Y. 10453
AREA 212 584-0700

Research Division

August 31, 1967

Mr. A. W. Cizek
Code 937
Naval Applied Science Laboratory
Naval Base
Brooklyn, New York 11251

Reference: Contract N00140-67-C-0107.

Dear Mr. Cizek:

In reference to our telephone conversation we are sending you a third panel, marked "C".

This panel has a new topcoat based on a polyurethane-polyamide combination, where the polyurethane (Adiprene L 167) has a higher isocyanate content than in our earlier panel. There we used an Adiprene L 100 with polyamide. The higher isocyanate content is expected to produce a higher degree of cross-linkage and greater hardness.

The paint composition (V-5-38) consists of:

9 g Carbon Black Monarch-74
22 g Zinc Oxide XX 601
50 g 2-nitropropane
95 g of a 33% Solution of Polyamide Resin VERSALON-1140 in Benzene and Propanol.

After ball-milling are added:

13 g Adiprene L 167
1.5 g Accelerator Altax
1.5 g volatilized and quenched sulfur (Crystex).

The panel coating consists of:

Wash-Primer MIL-P-15328 B	0.55 mil
Red Lead Vinyl Primer MIL-P-15929 B	5.00 mil
Six Coats of topcoat V-5-38	12.45 mil
Total thickness	18.00 mil

In this application it is observed that each of the new topcoats produces an average film thickness of 2 mil.

All coats were brushed on and air dried. The panel has been aged for 1 week before mailing it to you.

Yours very truly,

Max Kronstein
Senior Research Scientist

U.S. NAVAL APPLIED SCIENCE LABORATORY

TABLE 1

TEST RESULTS OF SONIC EROSION OF EXPERIMEN
(Using NASL High Sonic Pulse Facility - Power

Panel No.	Paint Coating System (1)(2)	Dry Film Thickness (Total-MILS)	Test Period HOURS	Eroded Area, Sq. Top Coat Paint Removed	Eroded Area, Sq. Paint To Bare Metal
A	2 Coats Wash Primer F117 Multiple Coats Red Lead F119 Multiple Coats Exp. Paint V-4-152	22.5	4½	0.065	0.04
			23	0.093	0.06
B	2 Coats Wash Primer F117 Multiple Coats Red Lead F119 9 Coats Exp. Pain V-5-22	23.5	4½	0.281	0.27
			23	0.435	0.40
C	2 Coats Wash Primer F117 Multiple Coats Red Lead F119 Six Coats Exp. Paint V-5-38	18.0	4½	0.081	0.07
			23	0.115	0.09

Note: (1) Coating systems were prepared and applied by Prof. Max Kronstein of N.Y.U. under Contract
12"X12"X1/8" hot rolled mild steel plates furnished by NASL.

(2) Panel No. designation and coating system data were supplied by Prof. Kronstein as per ref

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Enclosure (3)

TABLE 1

S OF SONIC EROSION OF EXPERIMENTAL COATING SYSTEMS
h Sonic Pulse Facility - Power Level 235 Volt-Amperes Average)

st riod URS	Eroded Area, Sq. In. Top Coat Paint Removed	Paint Removed To Bare Metal	Remarks
½	0.065	0.047	
3	0.093	0.065	After 23 hours, significant erosion to metal base in four irregular areas in approx. center of panel
½	0.281	0.272	
3	0.435	0.408	After 23 hours, substantial erosion to metal base in six irregular areas in approx. center of panel
½	0.081	0.072	
3	0.115	0.098	After 23 hours, significant erosion to metal base in two irregular areas in approx. center of panel

onstein of N.Y.U. under Contract N00 140-67-C-0107. The coatings were applied to
L.

d by Prof. Kronstein as per references (d) and (e).

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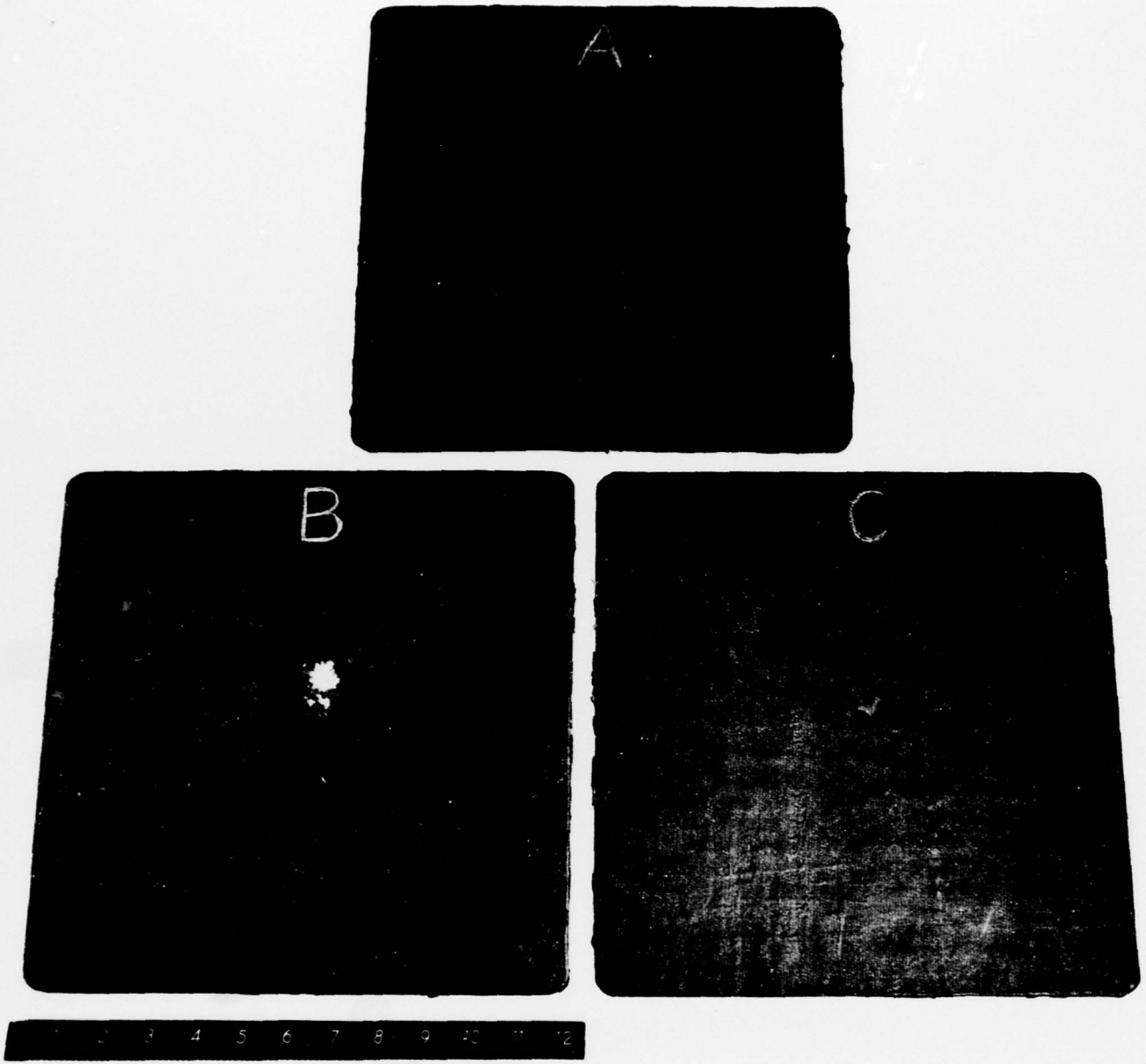

PHOTO L-21422

VIEW SHOWING DEGREE OF EROSION OF N.Y.U.
EXPERIMENTAL SONAR DOME COATING SYSTEMS

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